

Methamphetamine Use: Current Trends, Impact on the Brain, and Implications for Treatment and Recovery

Beth A. Rutkowski, MPH

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Sioux Falls, South Dakota

Educational Objectives

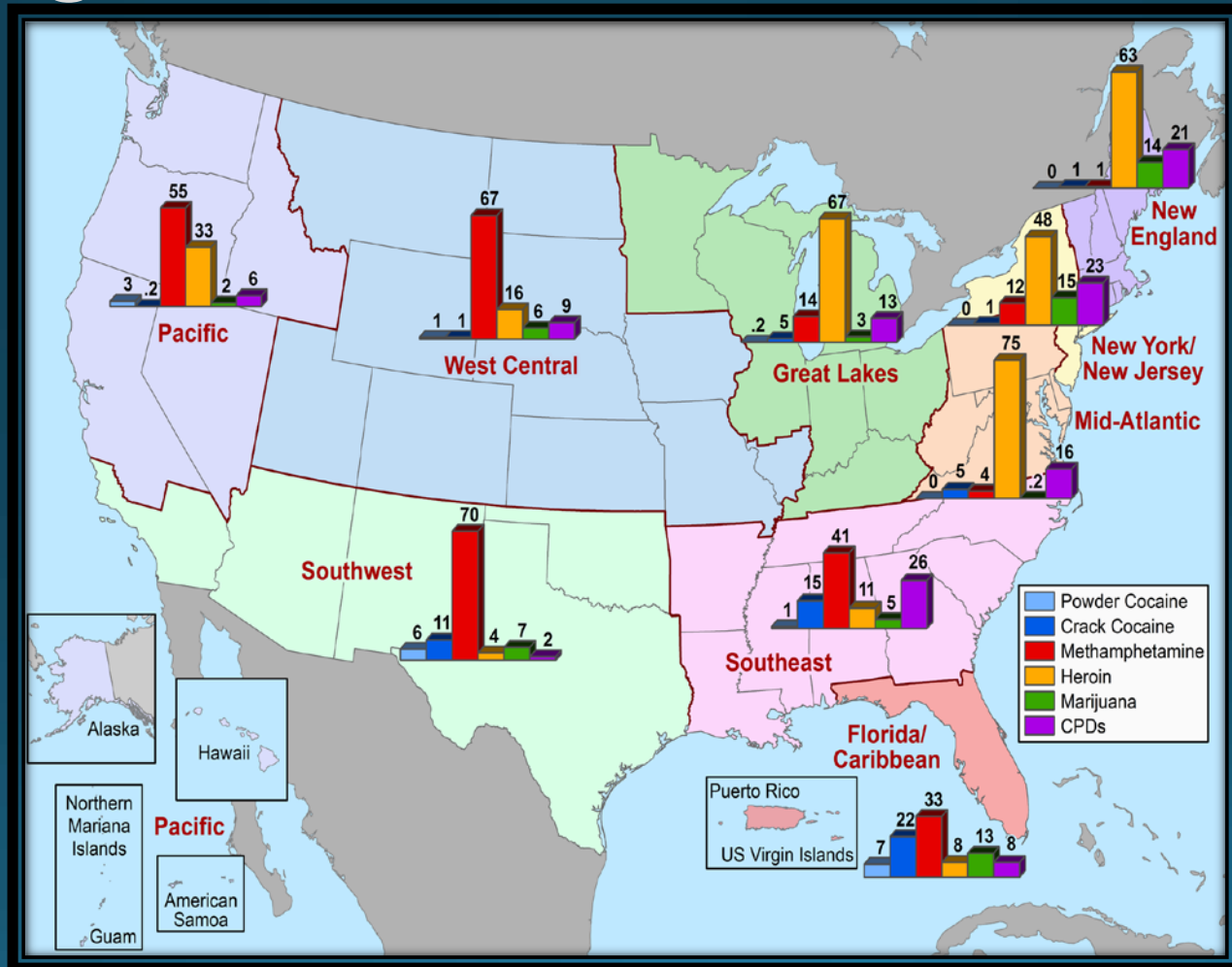
At the end of this presentation, participants will be able to:

1. Describe the **patterns and trends** of methamphetamine use, both locally and nationally.
2. List at least three (3) **short-term** and three (3) **long-term effects** of methamphetamine use.
3. Summarize at least two specific **behavioral interventions that have been proven effective** in treating people with a stimulant use disorder.

Patterns and Trends in the Use of Methamphetamine



Greatest Drug Threat Represented Regionally as Reported by State and Local Agencies: 2013-2015



Methamphetamine Lab Incidents: 2004 VS. 2014

Calendar Year 2004
Total: 23,829

Total of All Meth Clandestine Laboratory Incidents
Including Labs, Dumpsites, Chem/Glass/Equipment

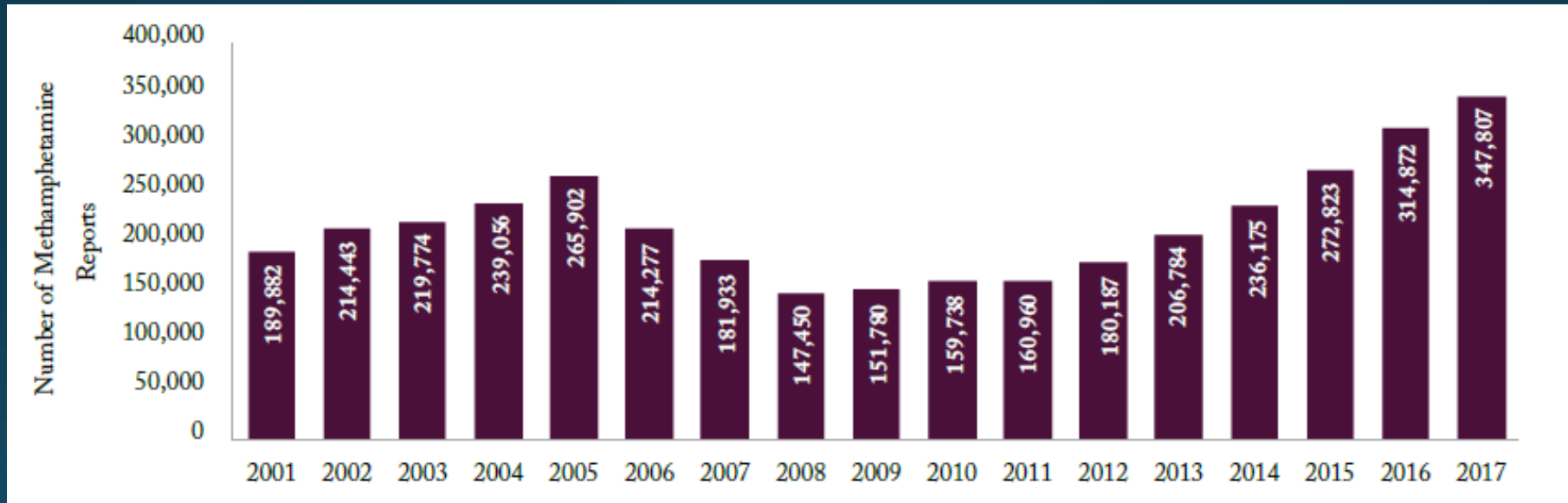


Environmental Effects of Meth

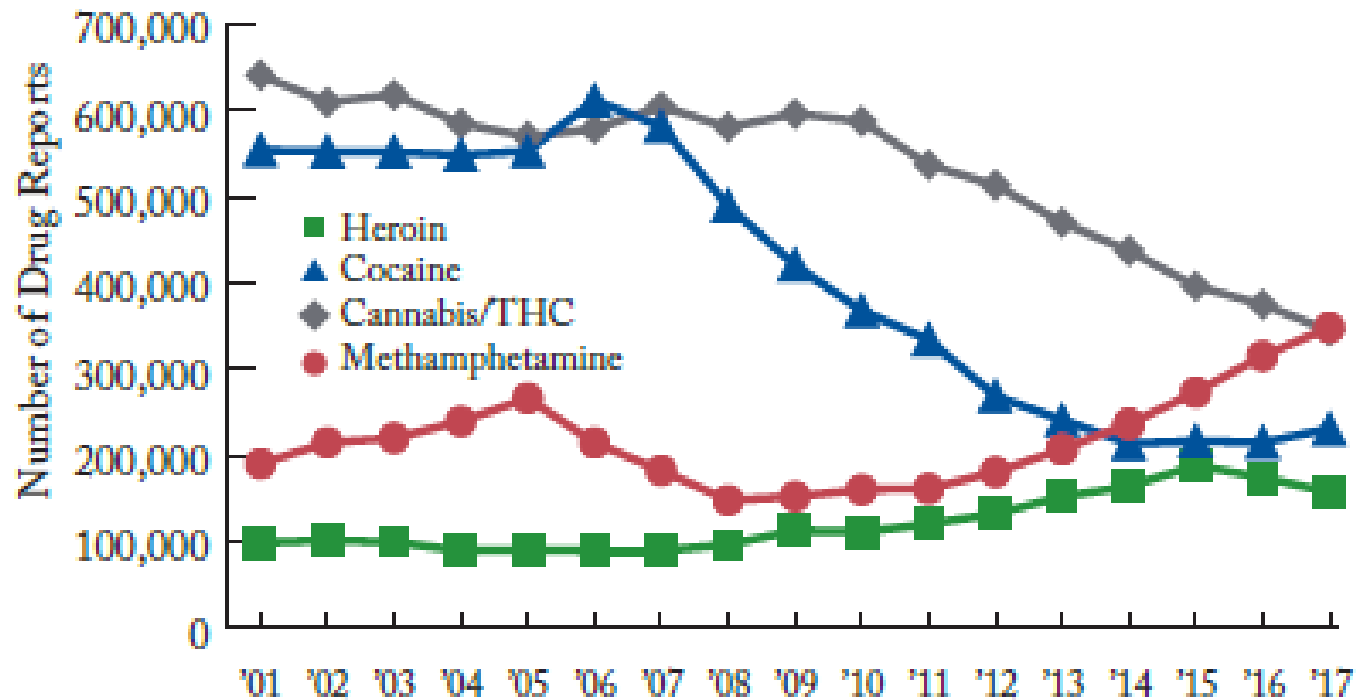
- Methamphetamine production leaves behind **5 to 6 pounds of toxic waster per pound** of meth produced.
- Toxic by-products contaminate production sites, posing serious health and environmental hazards to those who live and work nearby.
- The estimated cost to clean up **1 meth lab** often exceeds **\$4,000**.



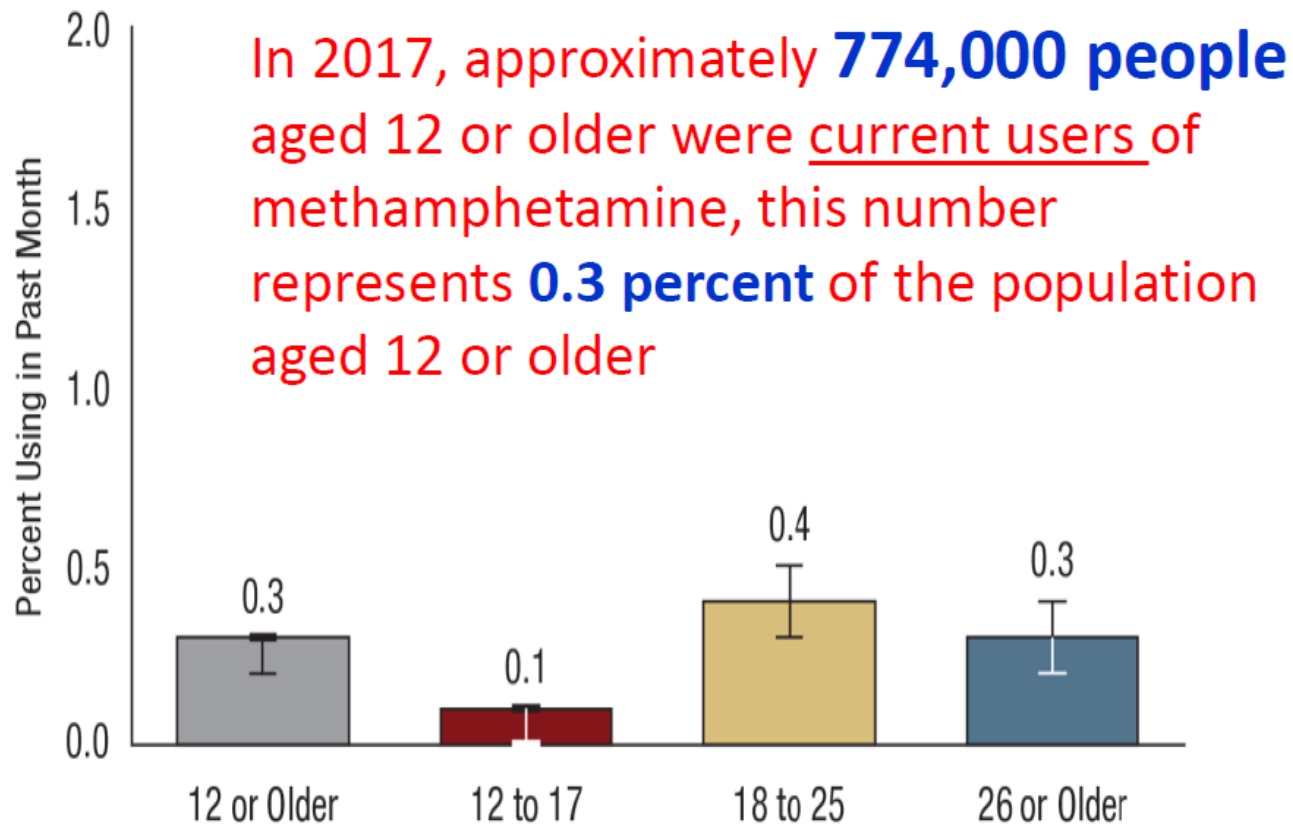
Methamphetamine Reports have Increased Nationally – NFLIS (2001-2007)



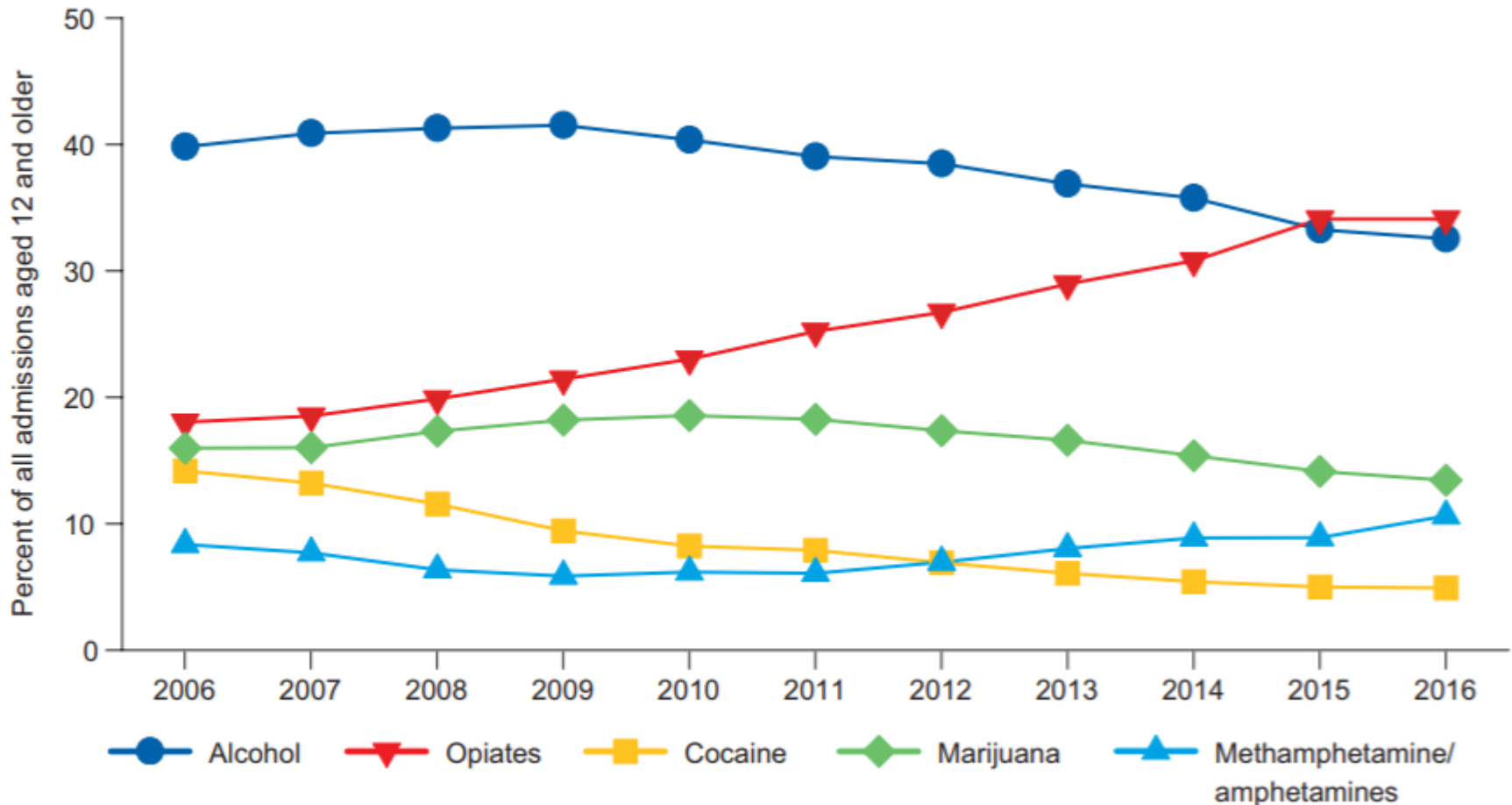
National Trends in Estimates for Heroin, Cocaine, Cannabis, and Meth, NFLIS, 2001-2017



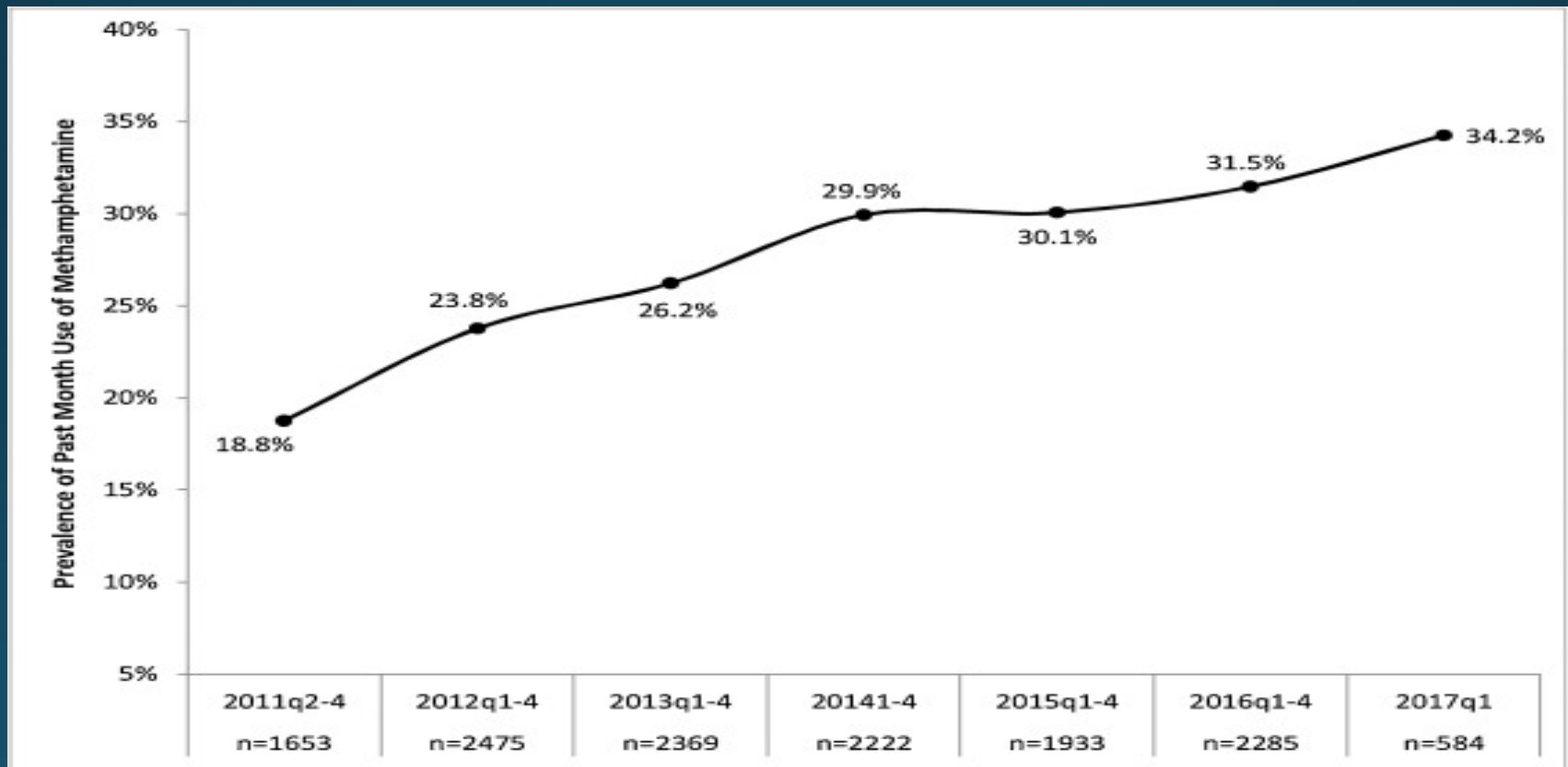
Past Month Methamphetamine Use among Americans 12 and older: NSDUH, 2017



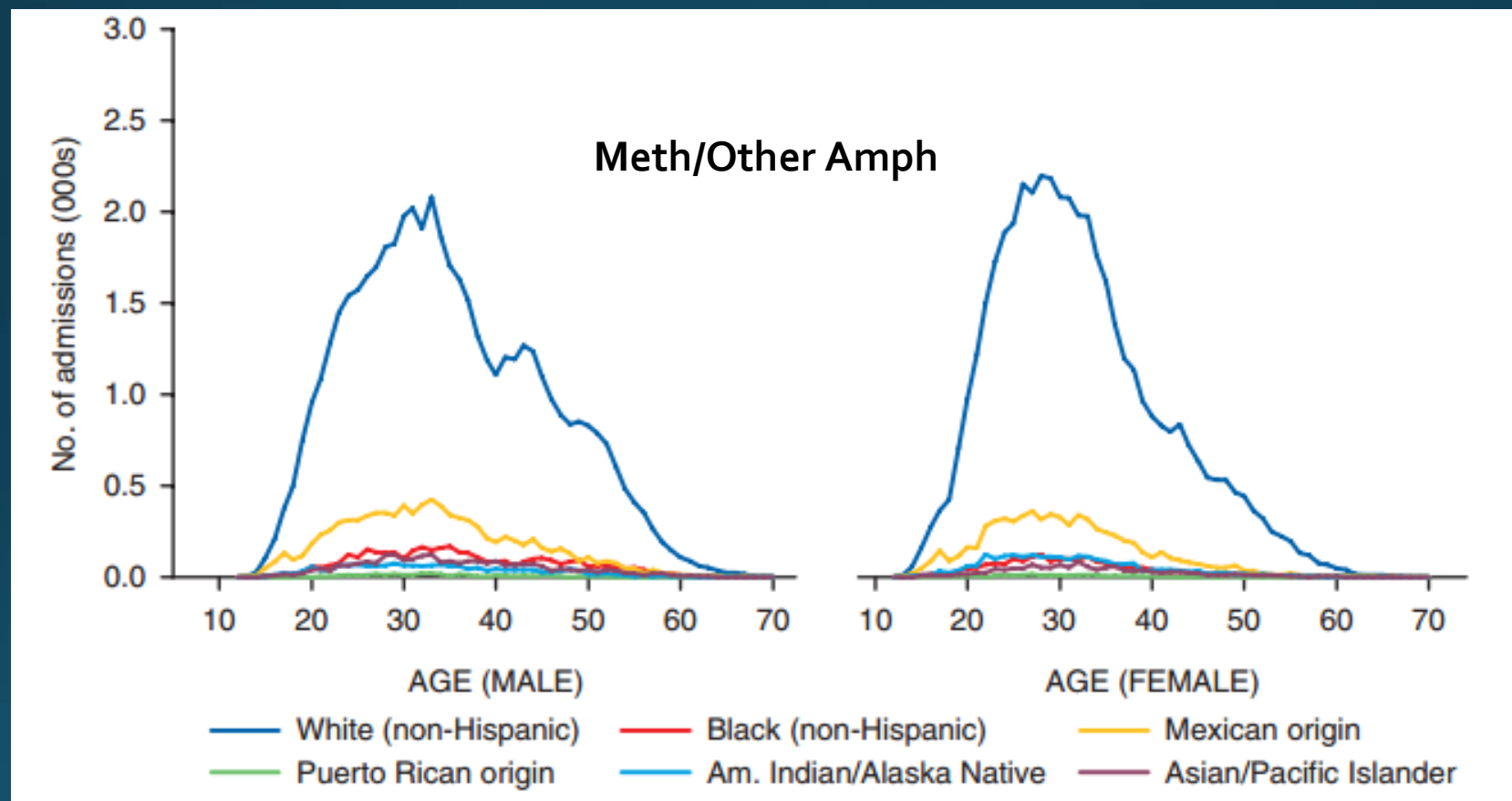
Primary Substance of Abuse at Admission: 2006-2016



Methamphetamine Use among Patients with Chronic Opioid Use is on the Rise



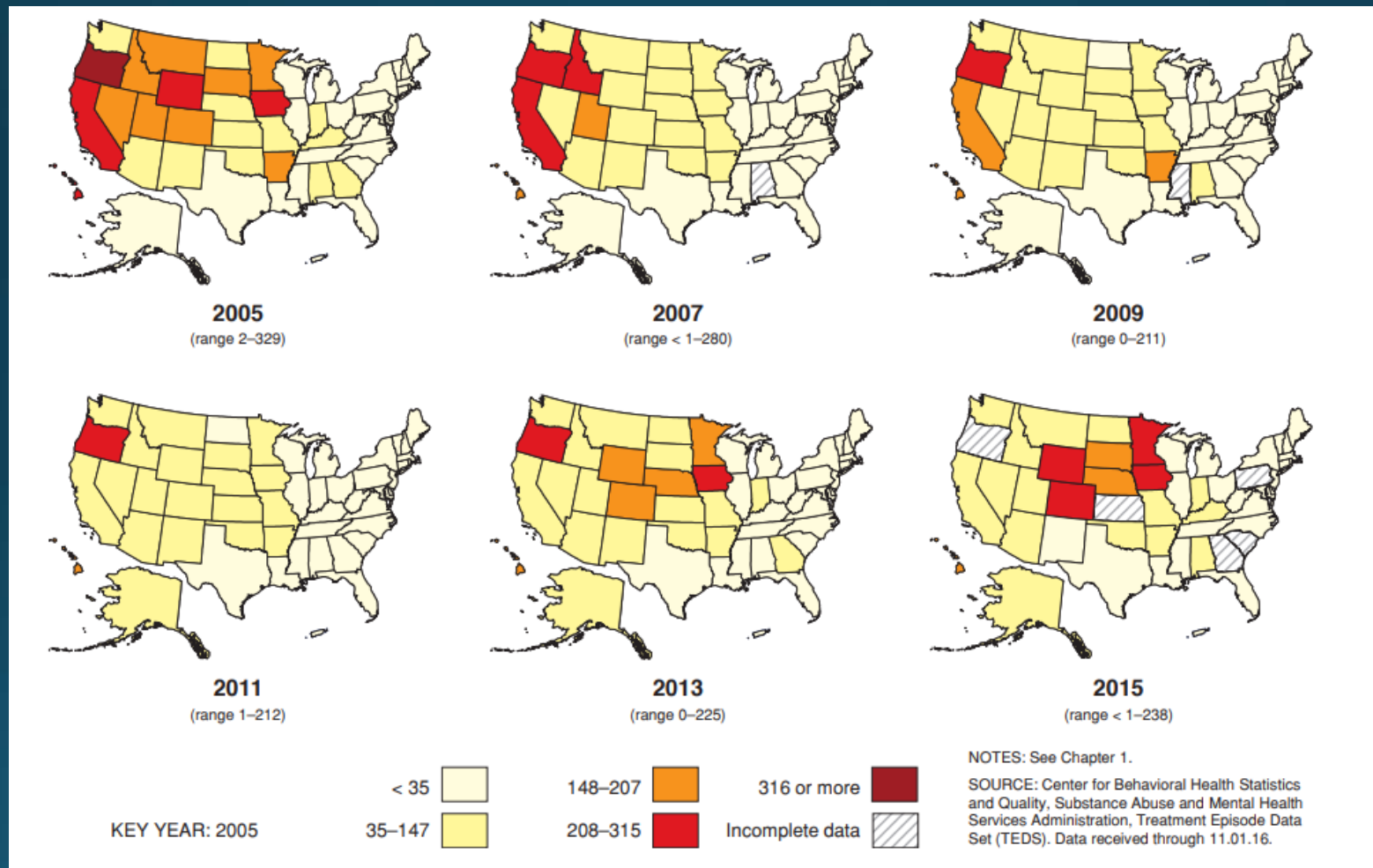
Stimulant Treatment Admissions, by Gender, Age, and Race/Ethnicity: 2014



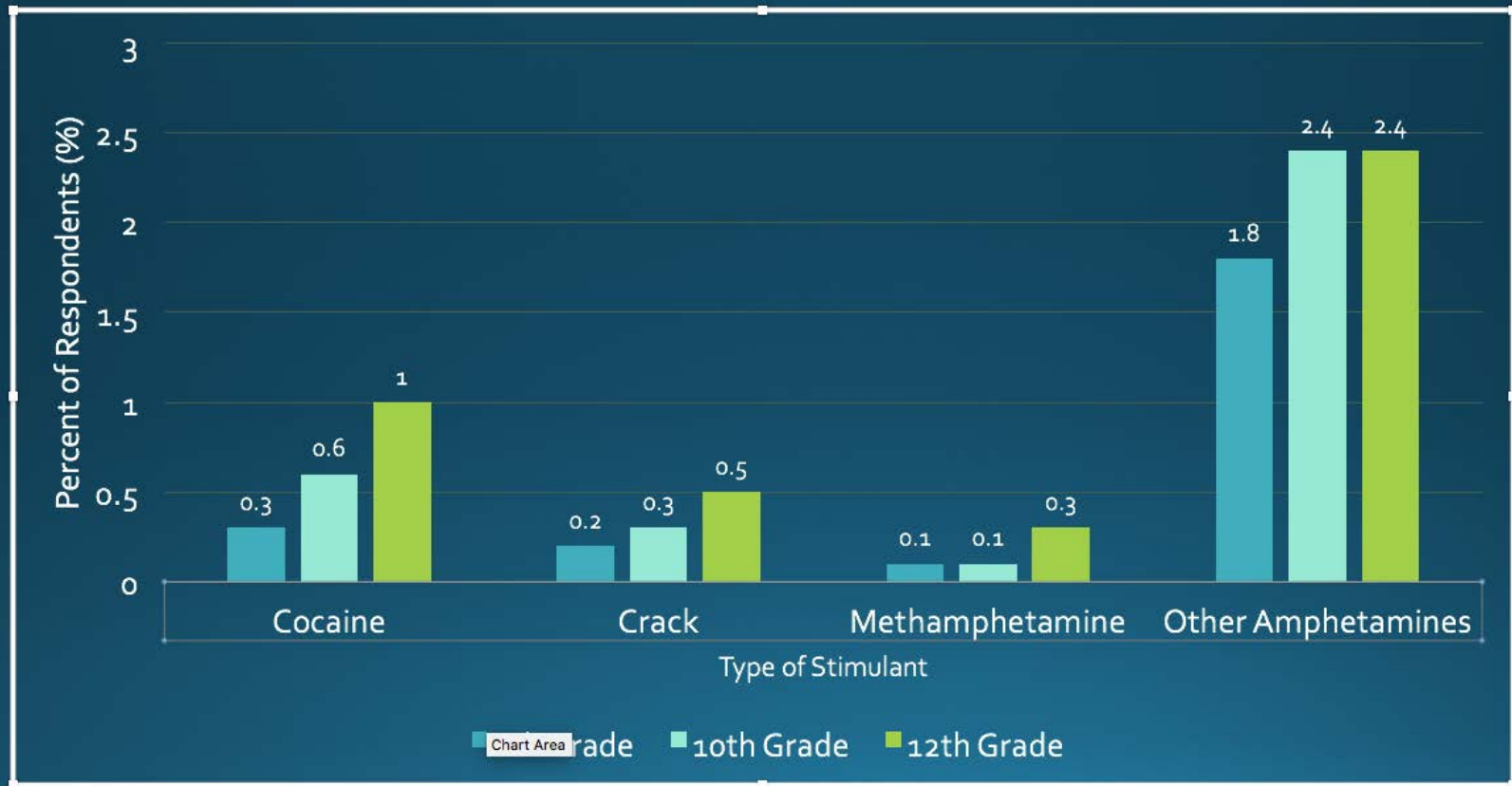
Perceptions of Methamphetamine in Indian Country

- Methamphetamine continues to be a significant problem in Indian country.
- Seventy percent of respondents stated that casinos located in their jurisdictions are being used to facilitate drug sales and sex trafficking by organized criminal gangs.
- Law enforcement respondents reported that their greatest challenge was a lack of community support and resources, namely manpower, necessary to fulfill their duties.
- Social service providers reported that they lack funds to fulfill the needs of the clients they serve, such as housing, clothing, food, baby supplies, and health and hygiene products.

Primary Meth/Amphetamine Rates, by State/Jurisdiction: 2005-2015



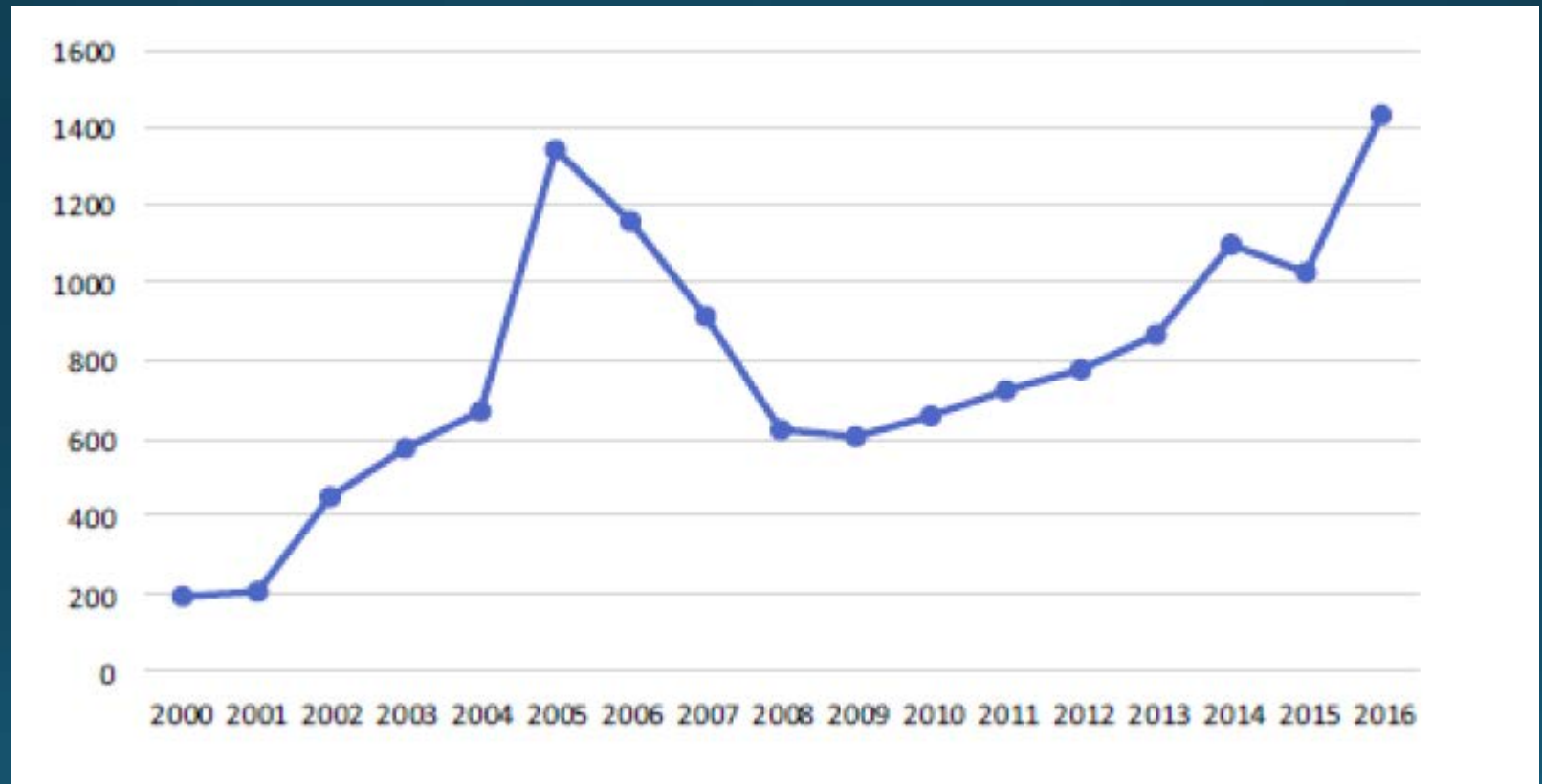
Past 30 Day Use of Stimulants among 8th, 10th, and 12th Graders: 2018



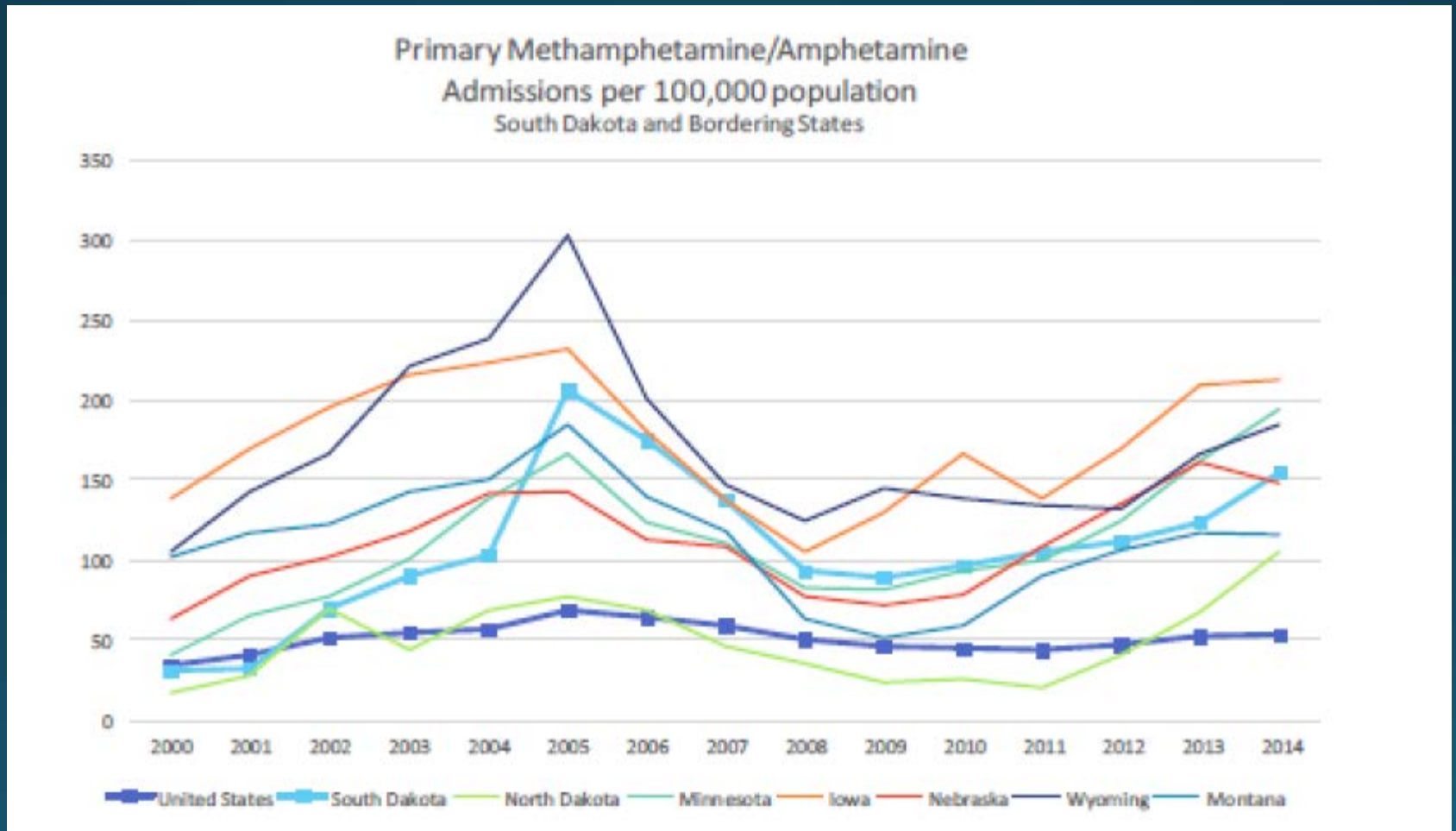
Methamphetamine Stats-at-a-Glance in South Dakota



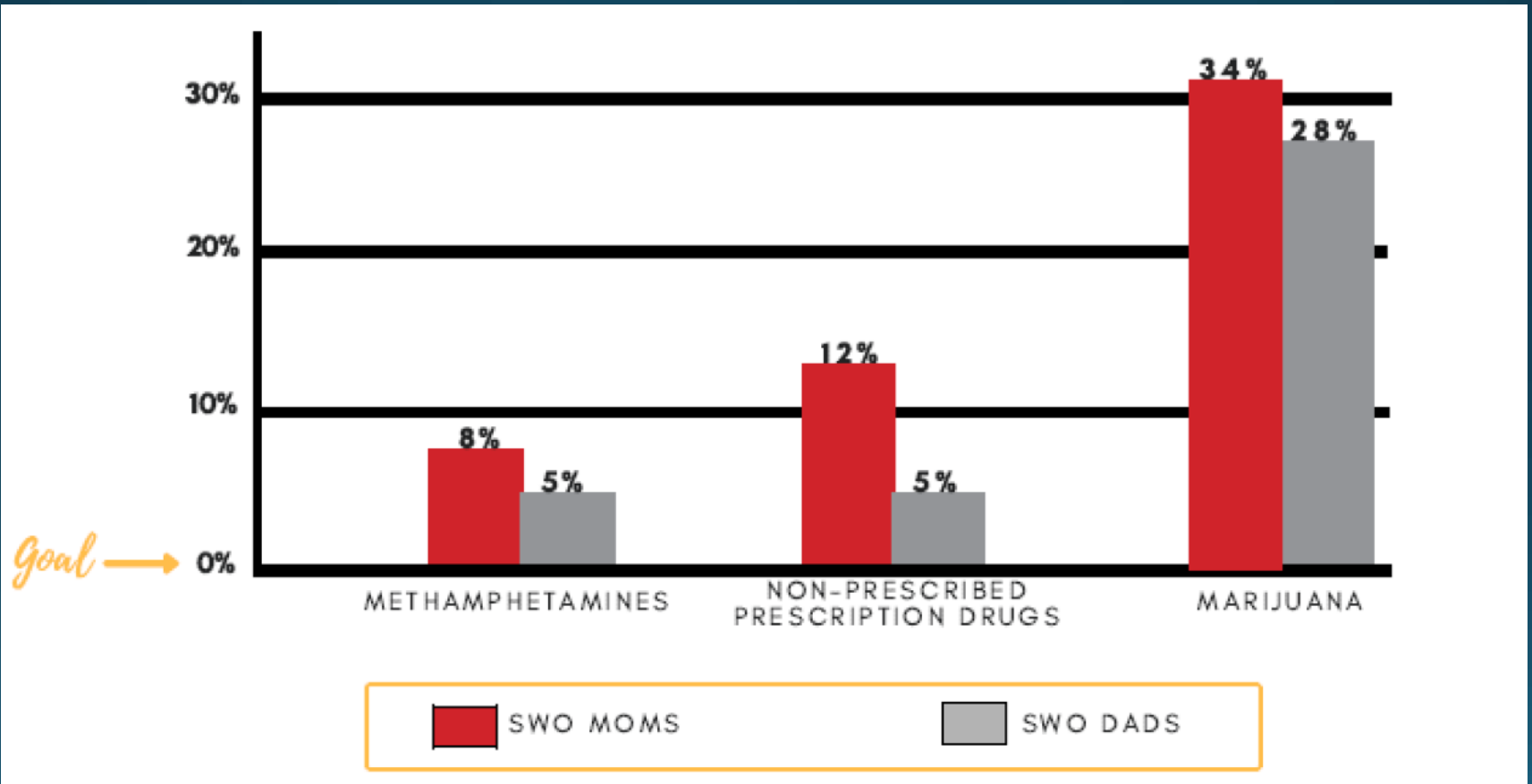
Increasing Trend in Methamphetamine Treatment Admissions in SD



A Similar Trend is Seen in Neighboring States



Reported Drug Use for SWO Parents in the Three Months Before Becoming Pregnant



Stimulants:
What are We Talking About?

The Broader Classification: Stimulants

Methamphetamine



Powder and Crack Cocaine



Methamphetamine

Methamphetamine Powder

Users' Description: Beige/yellowy/off-white powder

Base / Paste Methamphetamine

Users' Description: 'Oily', 'gunky', 'gluggy' gel, moist, waxy

Crystalline Methamphetamine

Users' Description: White/clear crystals/rocks; 'crushed glass' / 'rock salt'



Methamphetamine Manufacturing Processes – Three Methods

1. Ephedrine/Pseudoephedrine Based

“Nazi Method”-lithium, anhydrous ammonia

Cold method-red phosphorus, iodine crystals

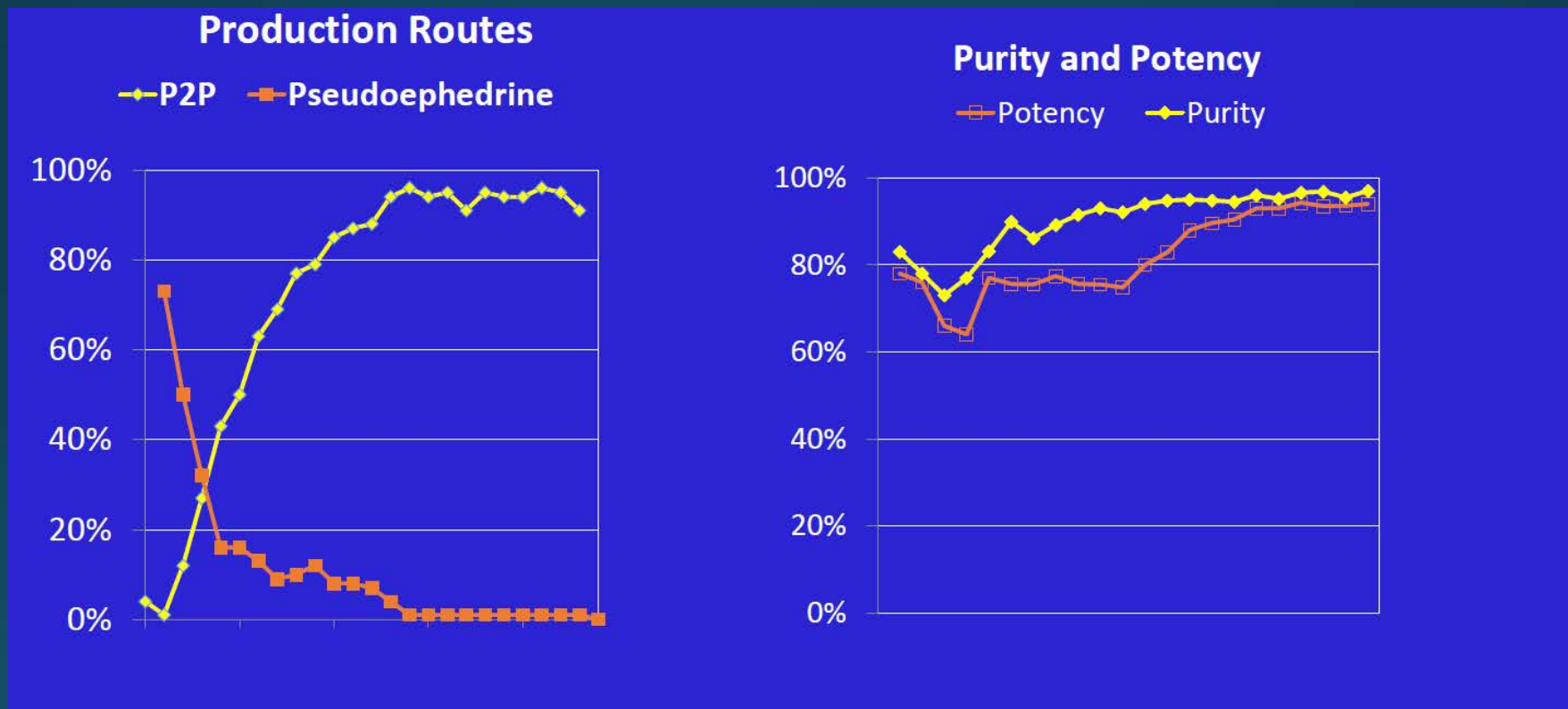
“One Pot” and “Shake and Bake” cooking using dry ammonia nitrite and cough syrup rather than liquid anhydrous ammonia



2. P₂P/Phenylacetone (Illegal in US-Schedule II, precursors legal in Mexico). Now cooked in large laboratories in Mexico with expert chemists

3. New synthetic method emerging with P₂P precursor and phenylacetic acid as pre-precursor—nitrostyrene

DEA Methamphetamine Profiling Program: National Data, 2006-2018



A Quick History of Methamphetamine

- Before 1970, amphetamine could be purchased over the counter
- 1970-1980: Meth made using the P2P phenylpropanone method. Bikers carried the product in their “crank cases”
- 1980: P2P becomes schedule II in the US but is still legal in Mexico. Meth in US is made from pseudoephedrine (PSE)
- 2005: PSE regulated by CMEA in US and banned in Mexico
- 2009: Significant shift from PSE to P2P as precursor
- 2014: New alternative P2P recipe (nitrostyrene) – made by skilled chemists

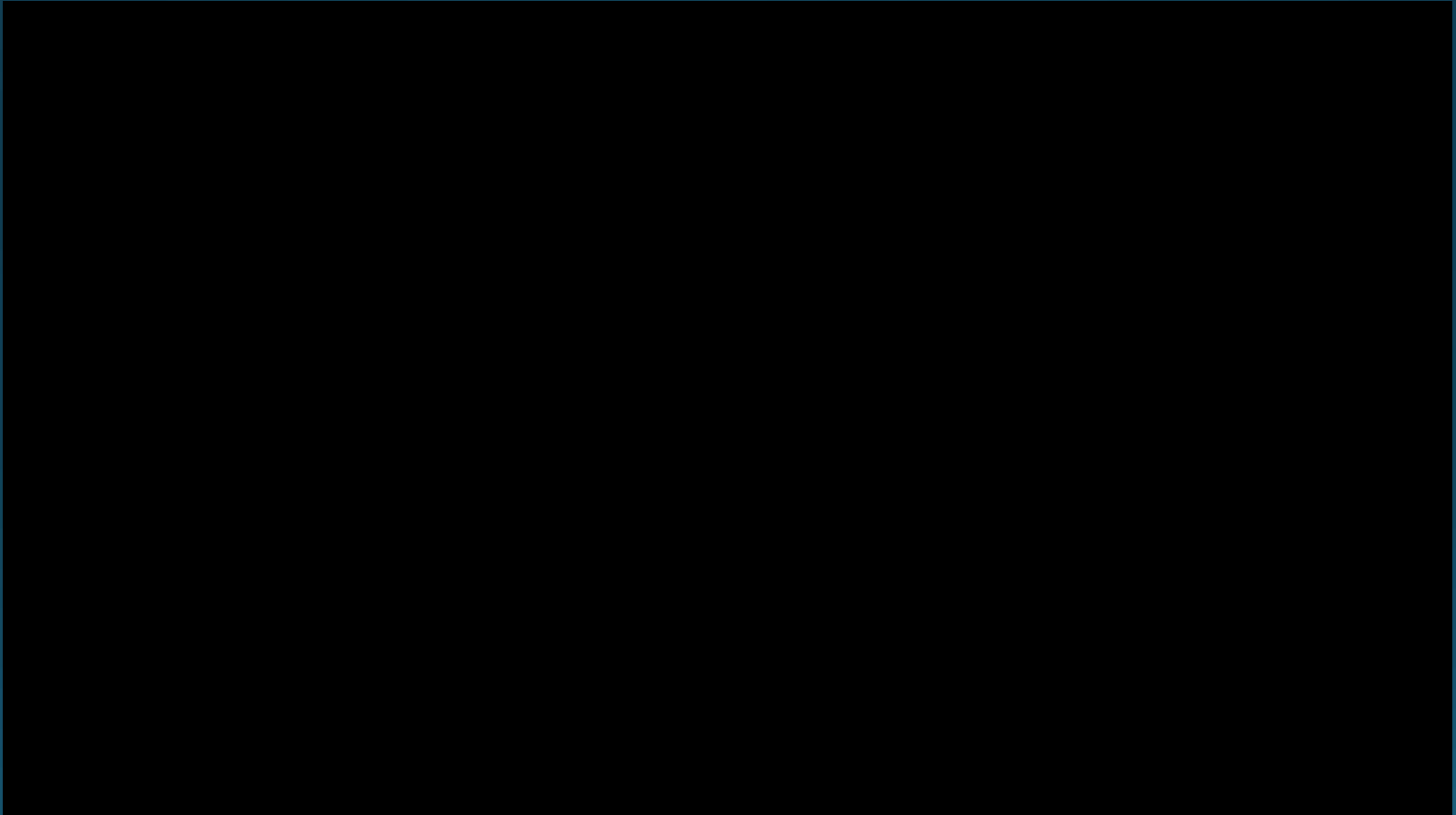


Differences in PSE and P2P Methods of Methamphetamine Manufacture

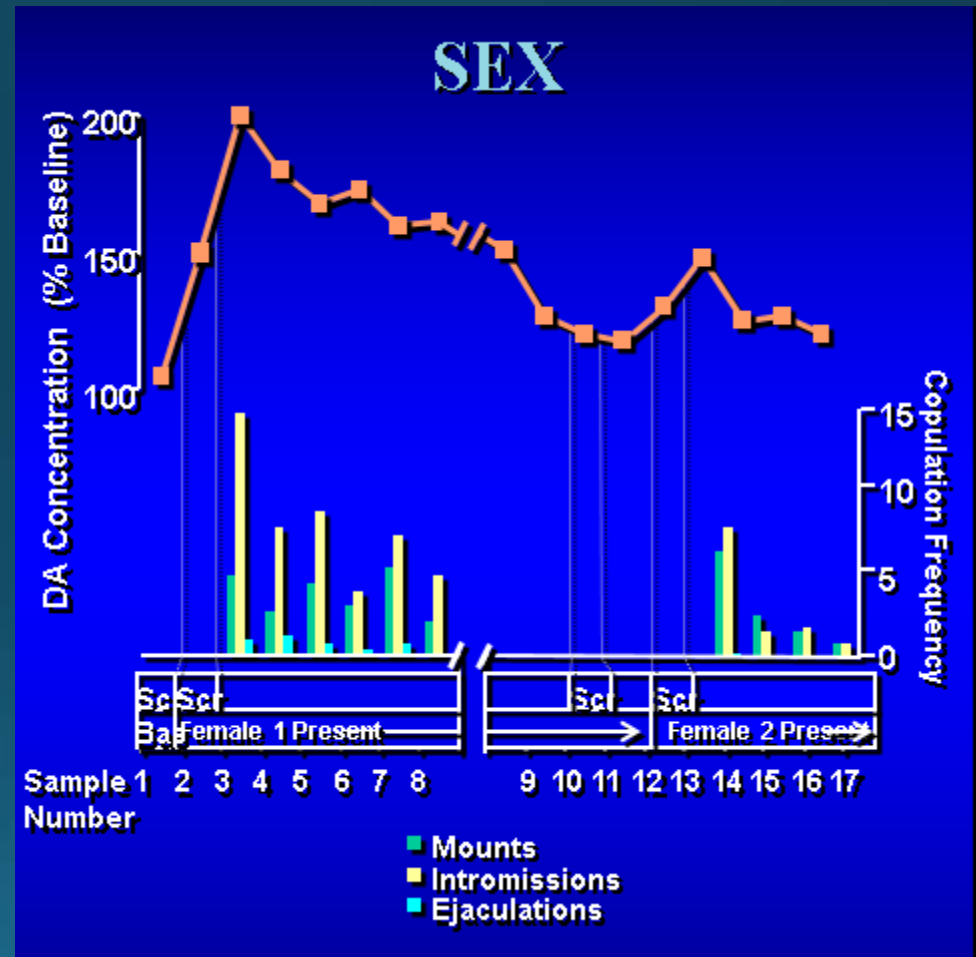
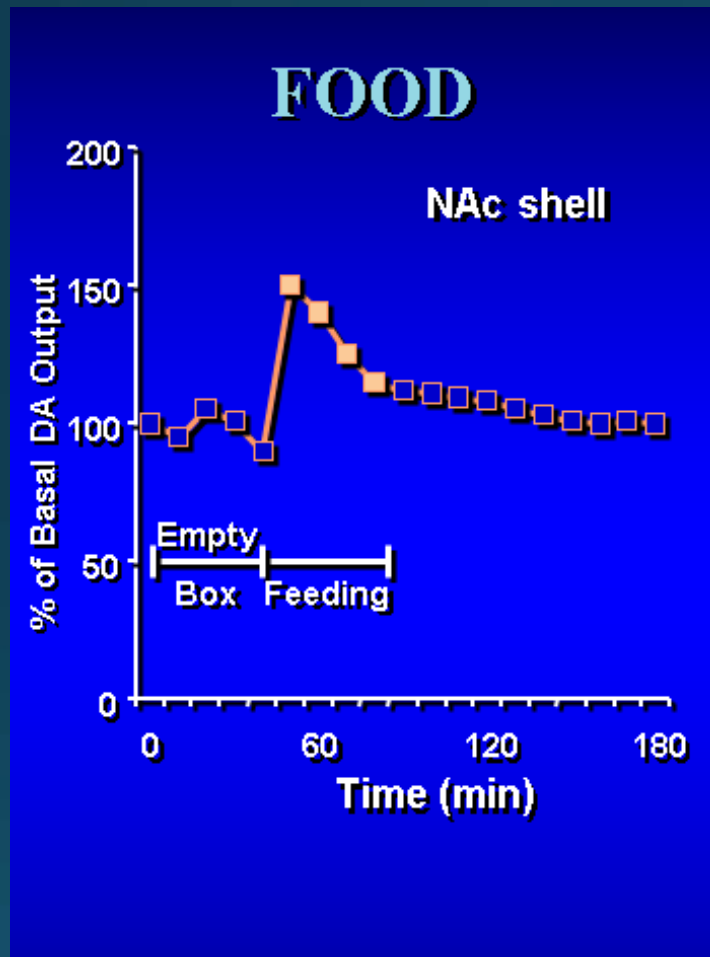
PSE	P2P
Made in homes and rural areas in small amounts; source is OTC medicines	Large-scale Mexican labs with expert chemists; source is local dealers
Either cooked for personal use or brought from local dealers	Imported from Mexico and often sold by cartels (which often traffic heroin)
Costs include clean up of lab sites, burns and chemical reactions	P2P has no clean-up costs in the U.S.

Similar societal and public health costs

Let's Take a Look at Normal Dopamine Functioning



Natural Rewards Elevate Dopamine Levels



Methamphetamine

Acute Physical Effects

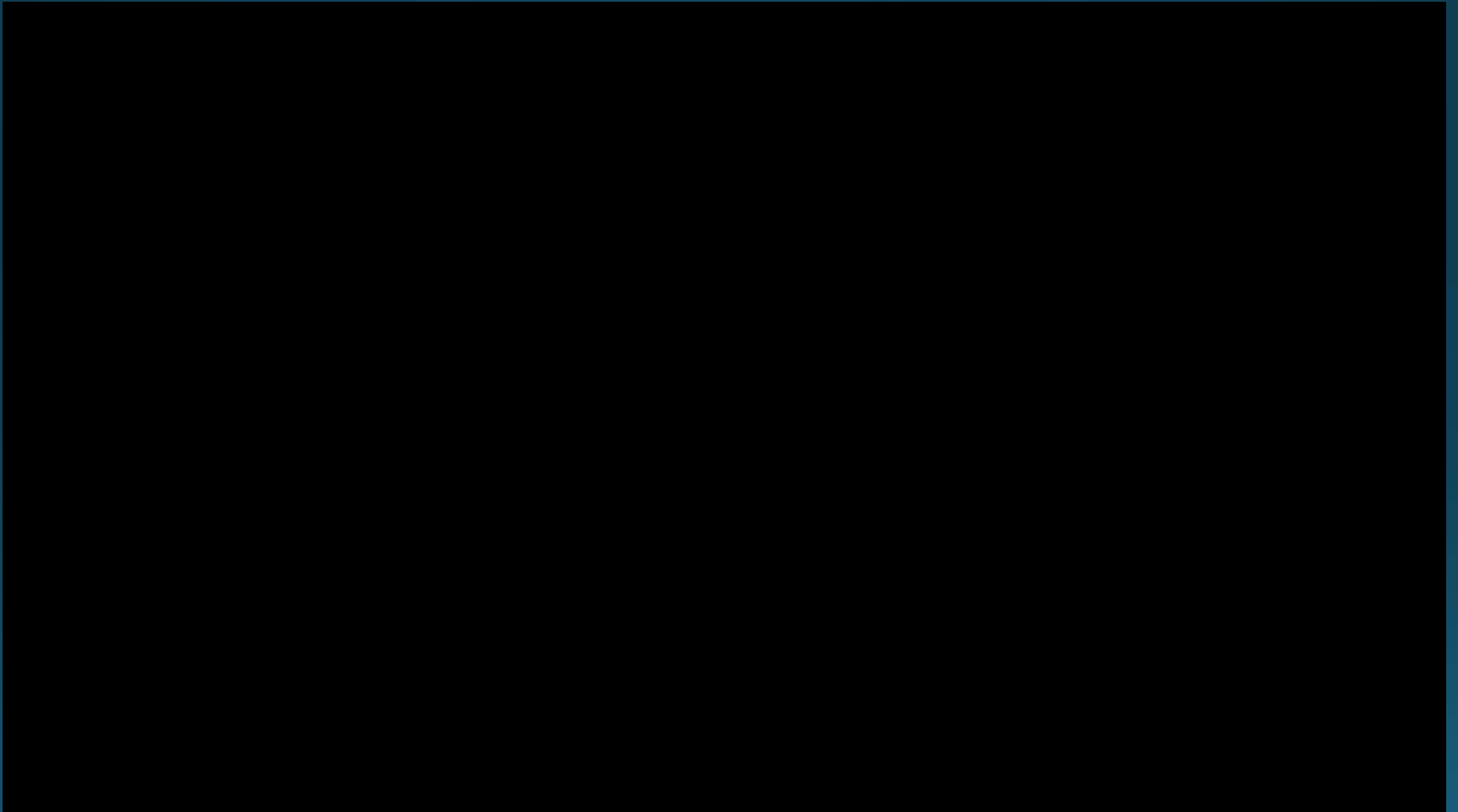
Increases

- Heart rate
- Blood pressure
- Pupil size
- Respiration
- Sensory acuity
- Energy

Decreases

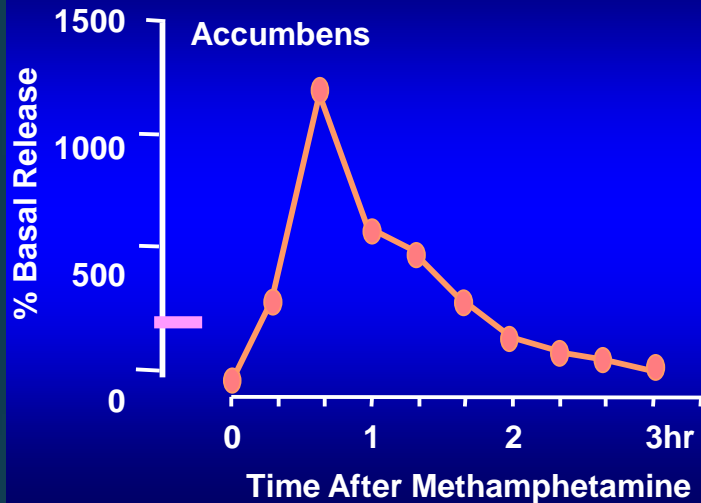
- Appetite
- Sleep
- Reaction time

How the Brain Responds to Meth

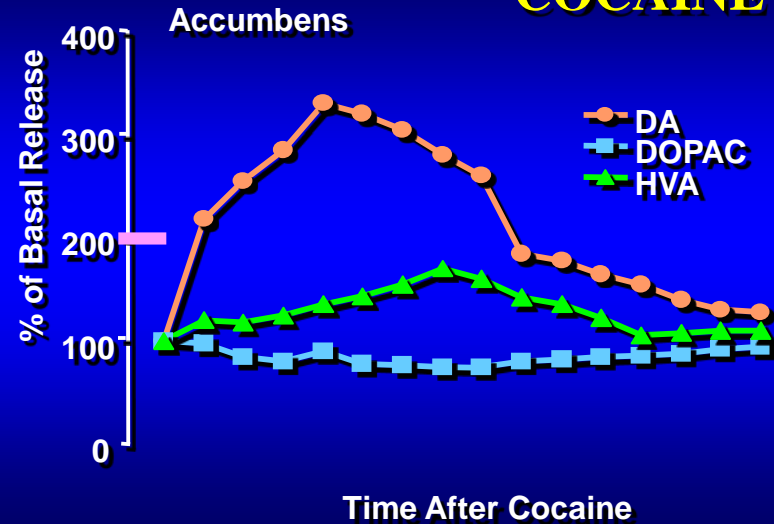


Effects of Drugs on Dopamine Release

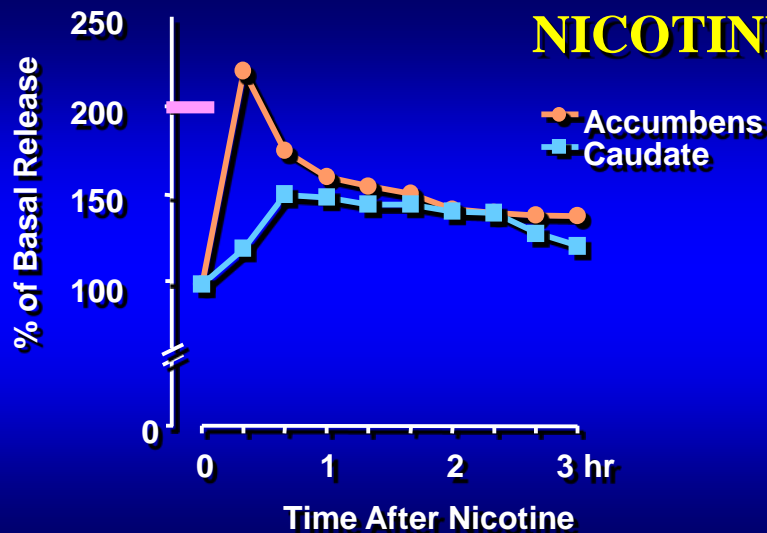
METHAMPHETAMINE



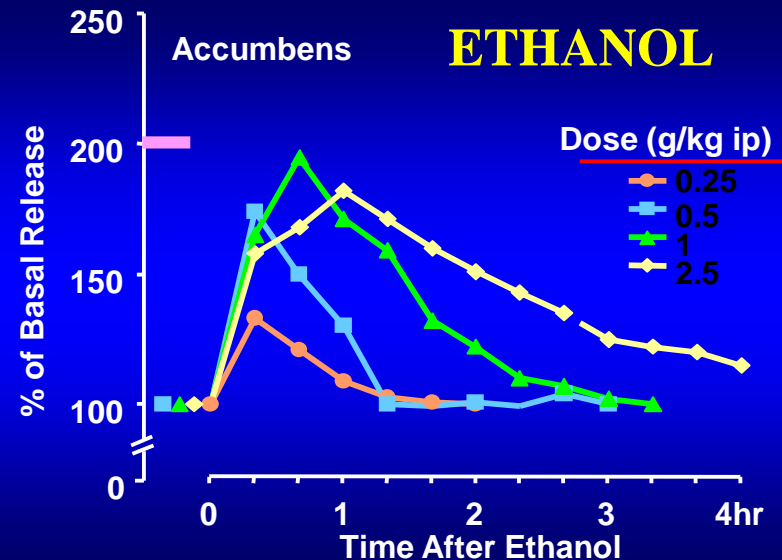
COCAINE



NICOTINE



ETHANOL



Methamphetamine

Acute Psychological Effects

Increases

- Confidence
- Alertness
- Mood
- Sex drive
- Energy
- Talkativeness

Decreases

- Boredom
- Loneliness
- Timidity

Methamphetamine

Chronic Physical Effects

- Tremor
- Weakness
- Dry mouth
- Weight loss
- Cough
- Sinus infection
- Sweating
- Burned lips; sore nose
- Oily skin/complexion
- Headaches
- Diarrhea
- Anorexia
- Tooth decay

Methamphetamine

Chronic Psychological Effects

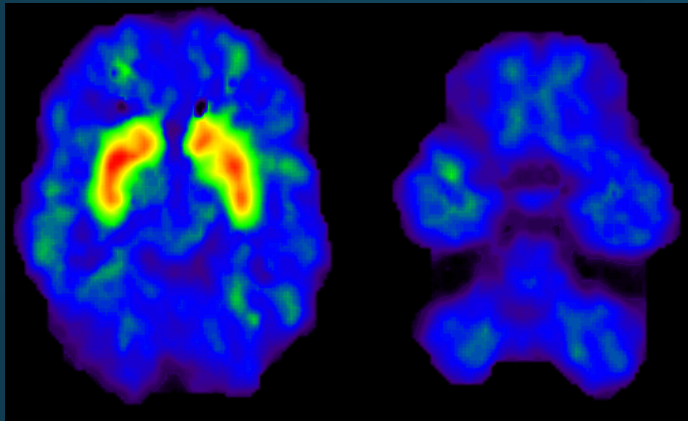
- Confusion
- Concentration
- Hallucinations
- Fatigue
- Memory loss
- Insomnia
- Irritability
- Paranoia
- Panic reactions
- Depression
- Anger
- Psychosis

Effects of Maternal Methamphetamine Use

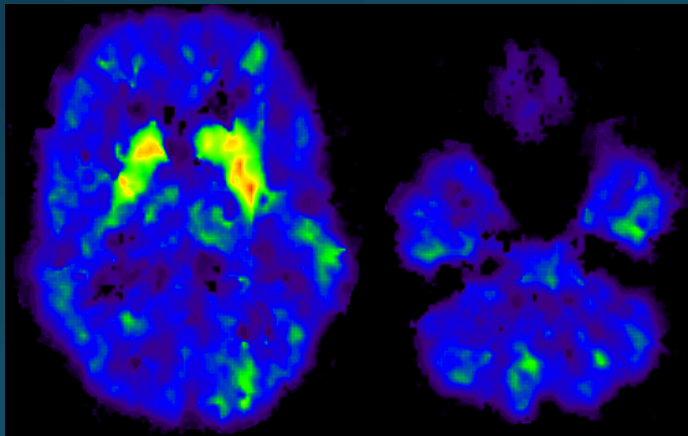
- Increased rates of premature delivery
- Placental abruption
- Small size and lethargy
- Cardiac and brain abnormalities
- Neurological problems
 - Decreased arousal
 - Increased stress
 - Attention impairments



Dopamine Transporters in Methamphetamine Abusers

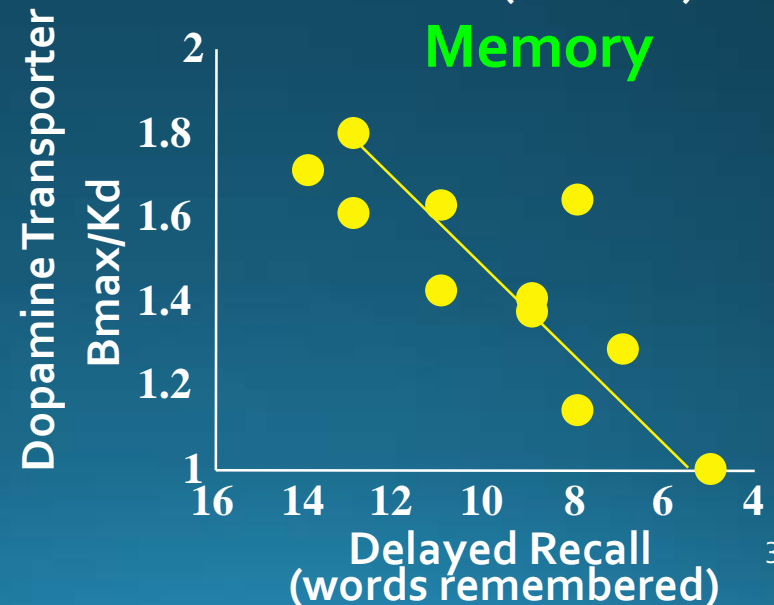
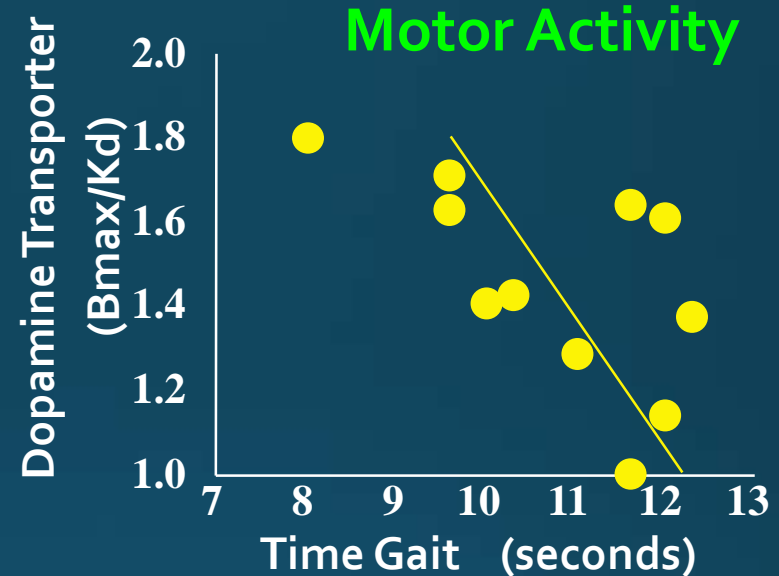


Normal Control

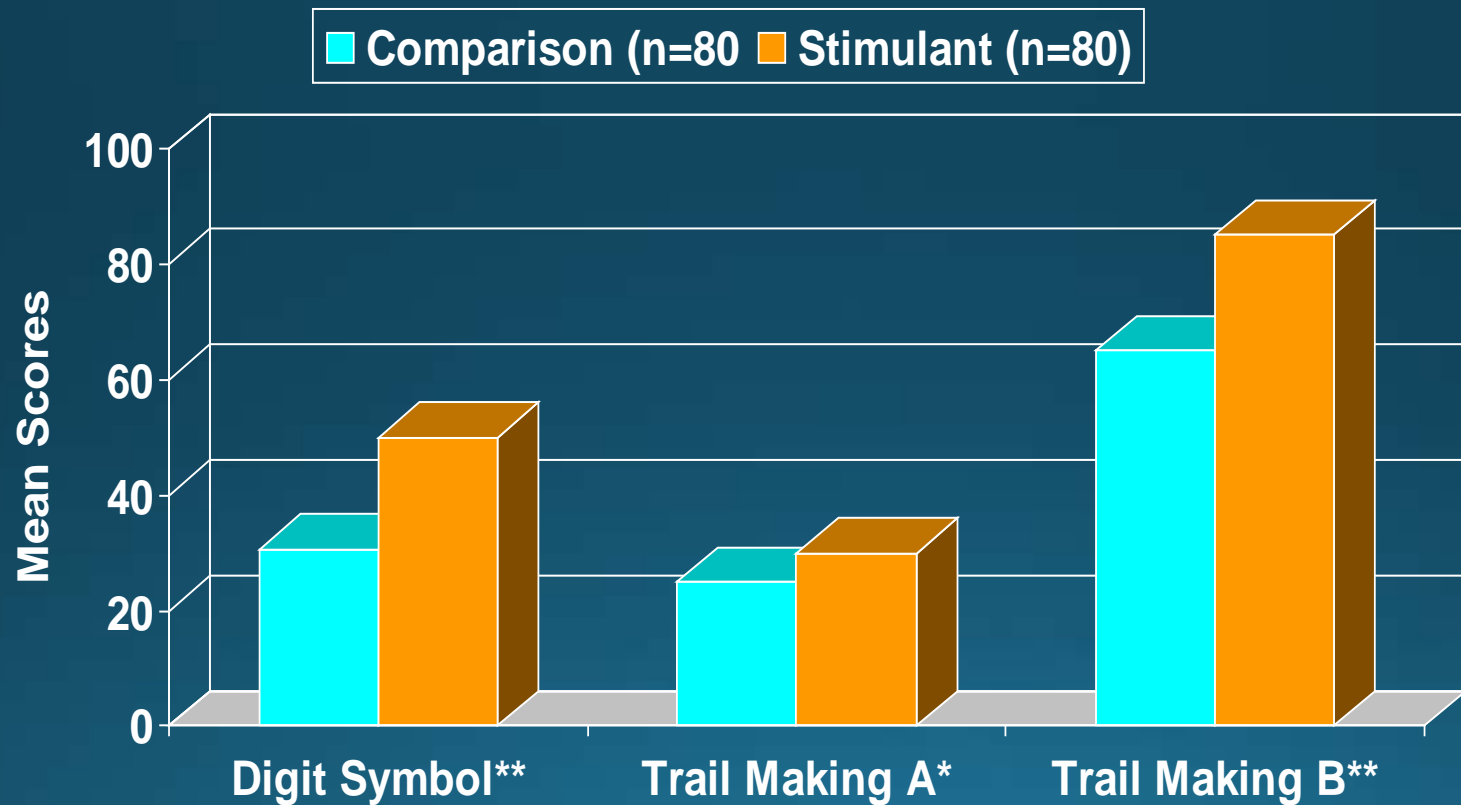


Methamphetamine Abuser

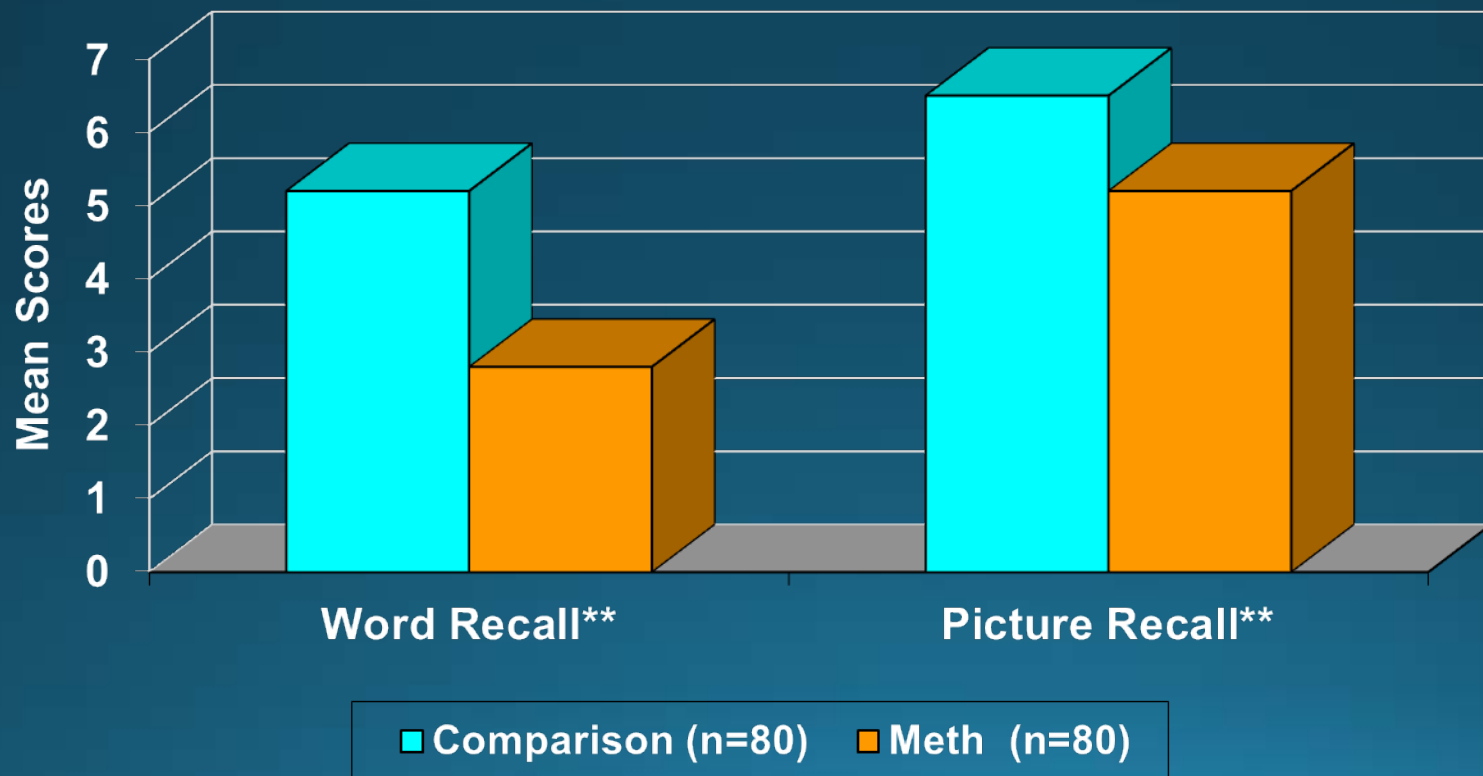
$p < 0.0002$

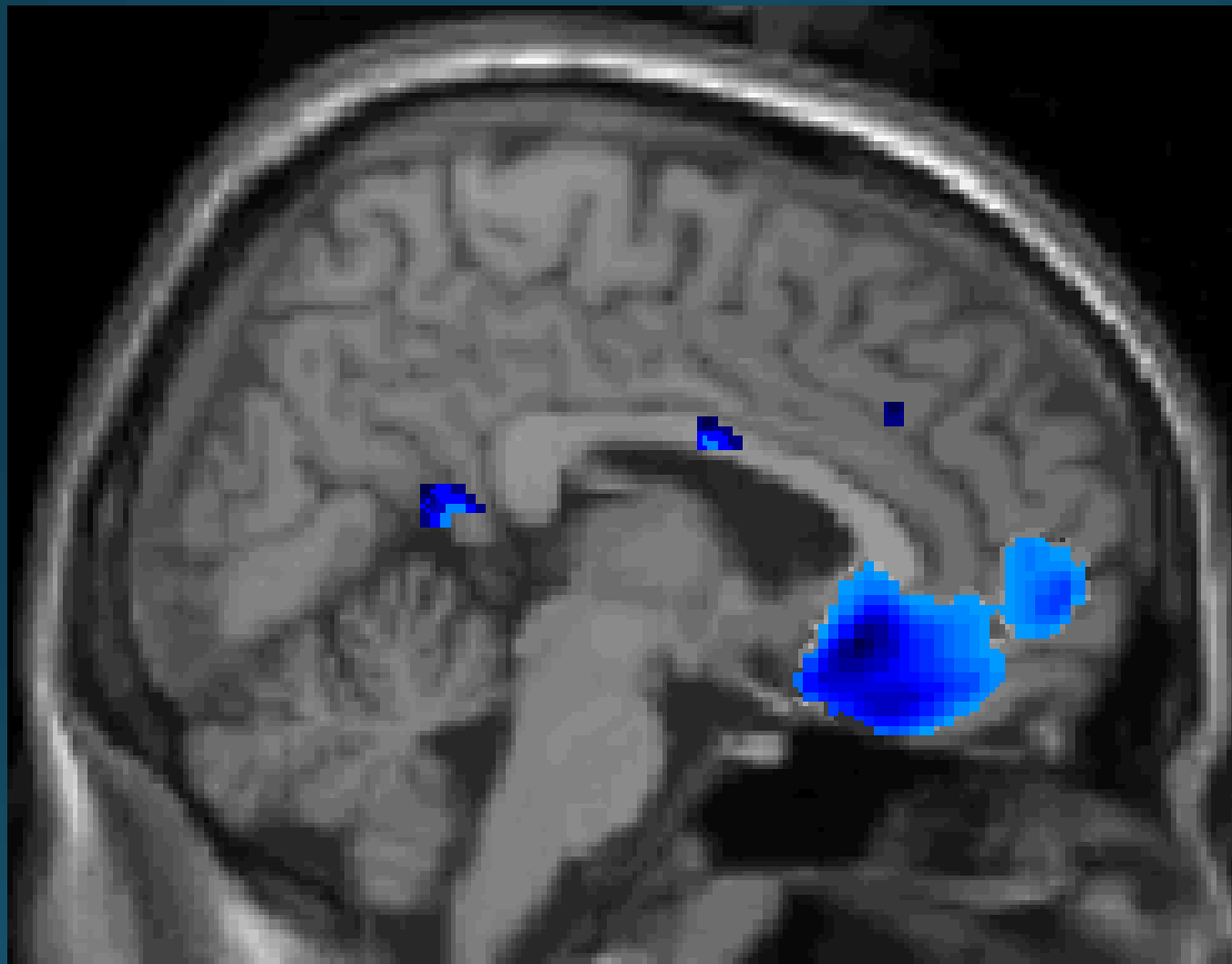


Differences between Stimulant and Comparison Groups on Tests Requiring Perceptual Speed

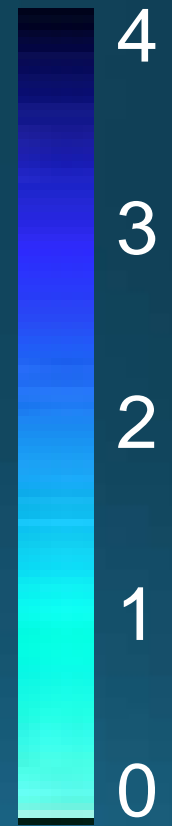


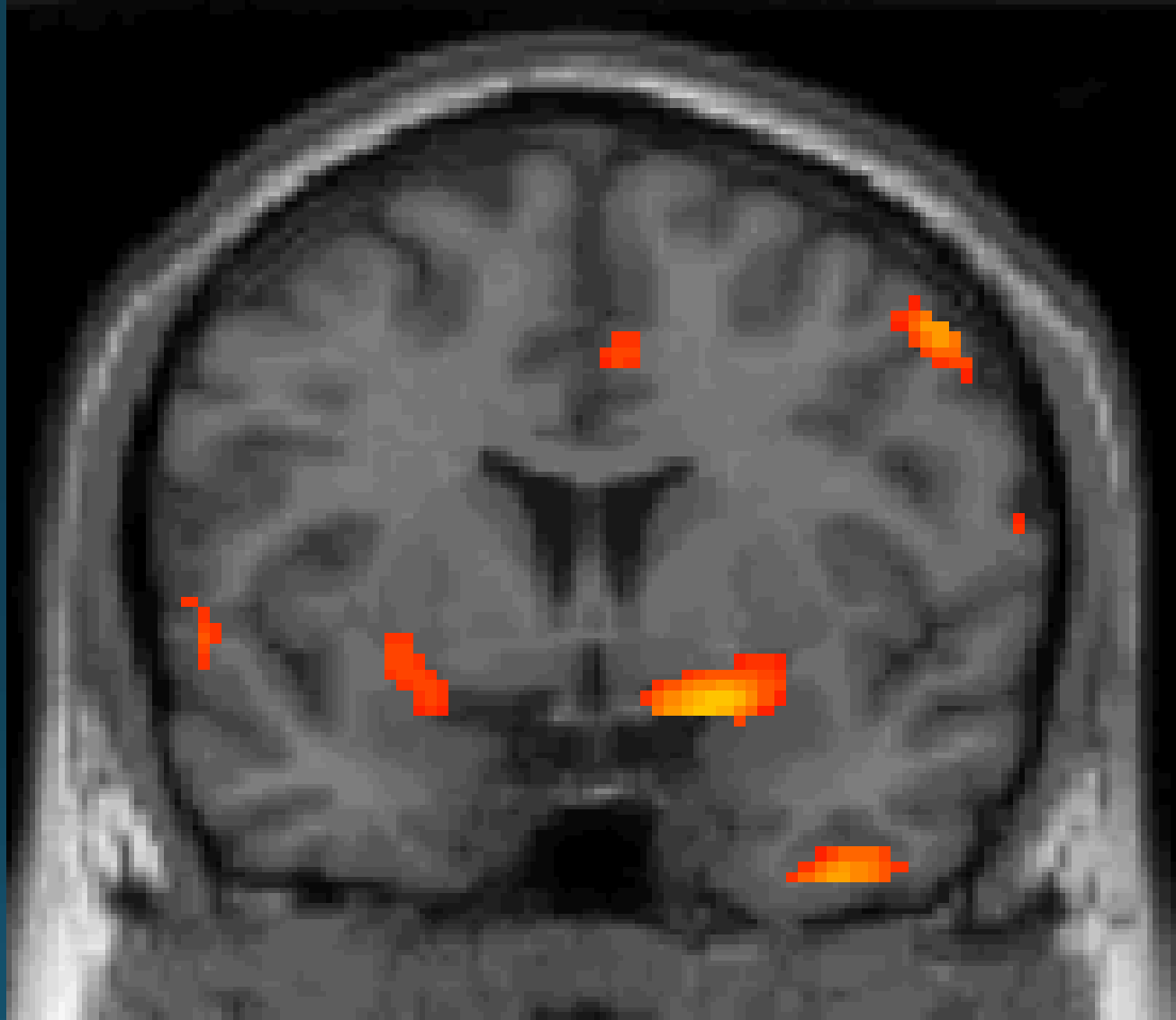
Memory Difference between Stimulant and Comparison Groups



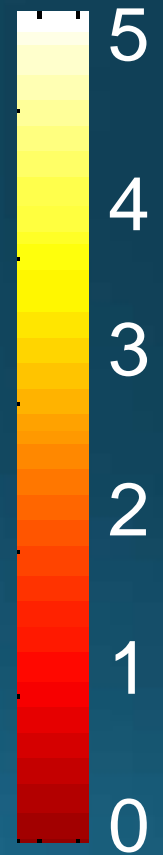


Control
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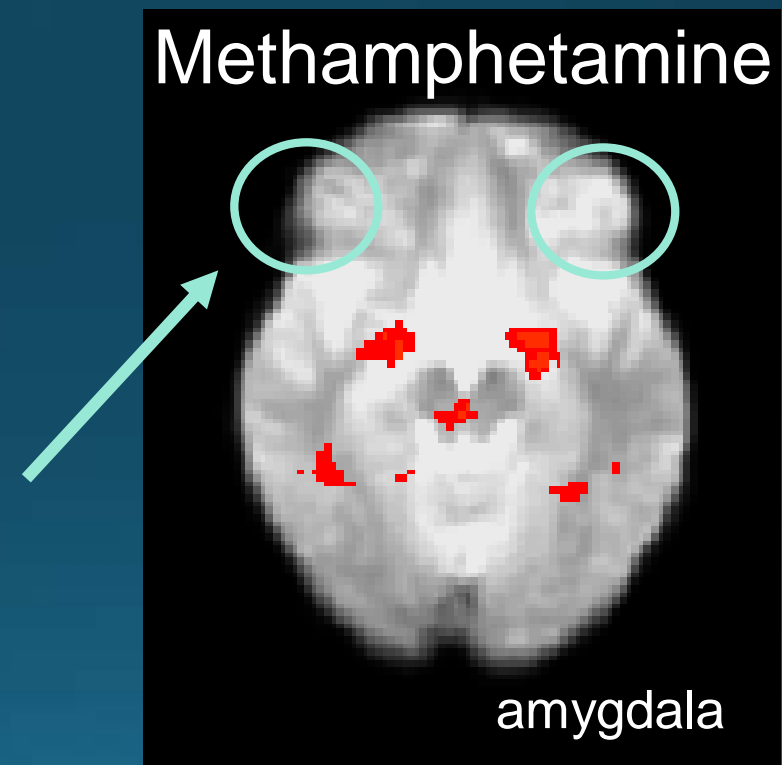
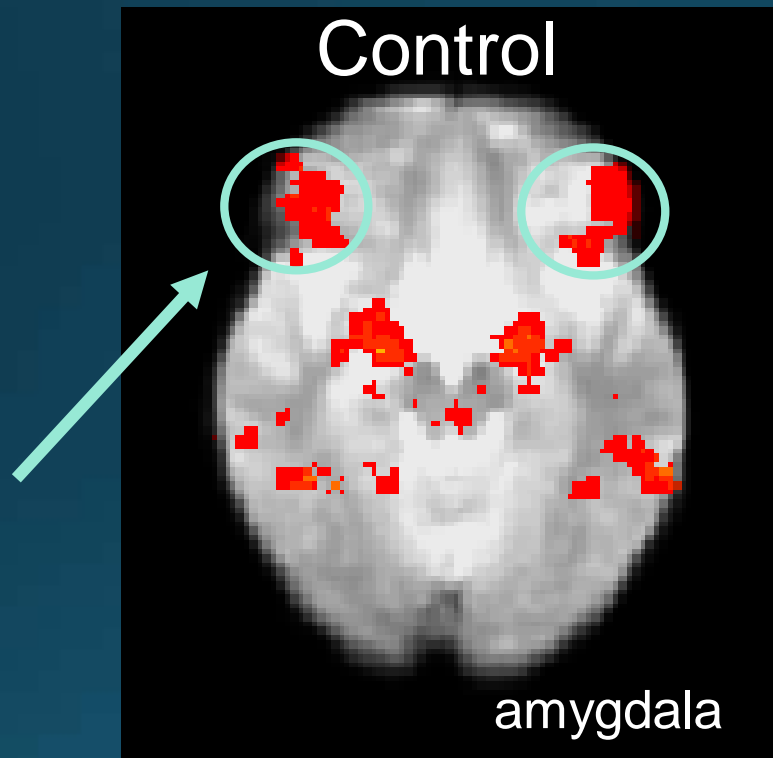




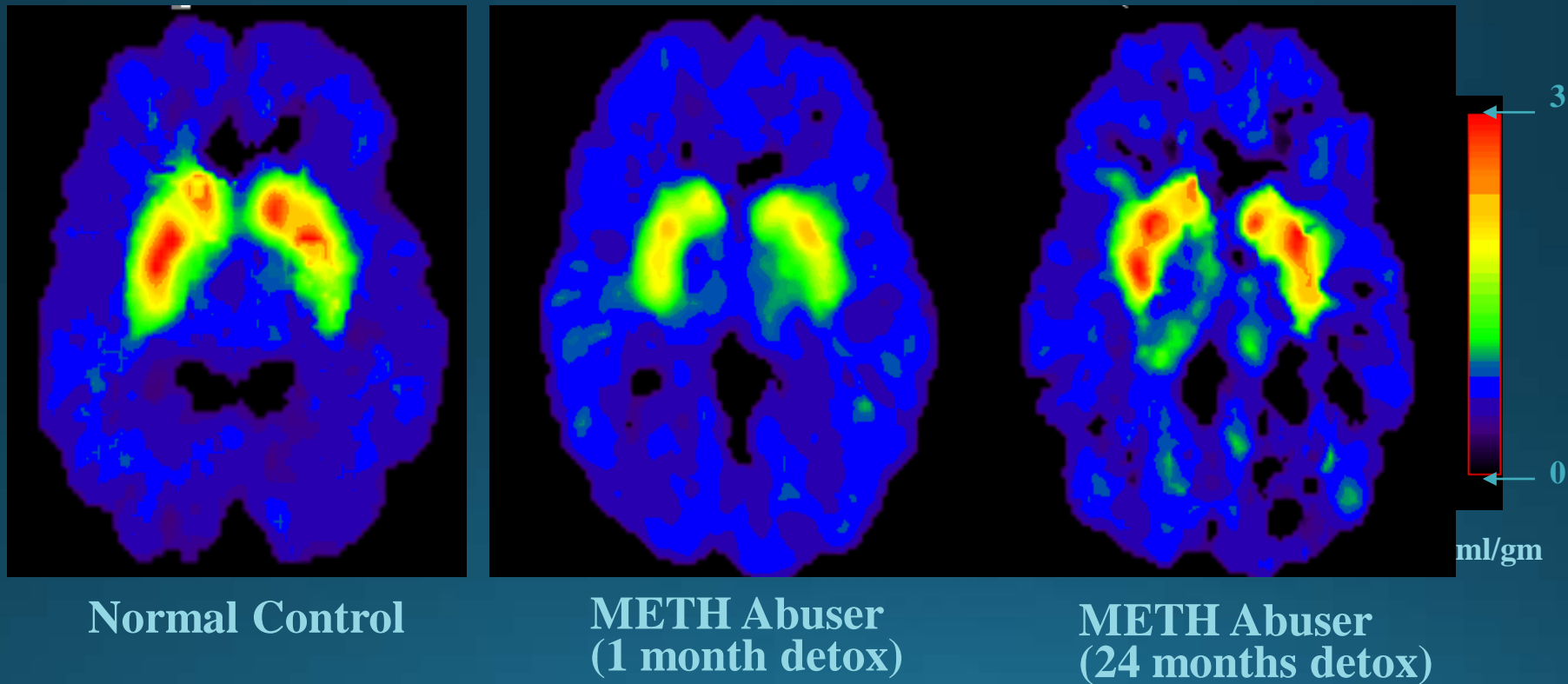
MA >
Control



Control Subjects and Methamphetamine Abusers Activate Emotion & Face Processing Areas



Partial Recovery of Brain Dopamine Transporters in Methamphetamine Abuser After Protracted Abstinence



A photograph of a person sitting on the ground against a rough, textured wall. The person is wearing a light-colored t-shirt and dark shorts, and is holding a syringe in their hands. A spoon is lying on the ground near their feet. The entire image has a teal overlay. The text "Effective Treatment Interventions for Stimulant Use Disorders" is centered over the image.

Effective Treatment Interventions for Stimulant Use Disorders

What Treatments are Effective for Stimulant Users?

- Stimulant use and addiction is a complex problem involving biological changes in the brain as well as a myriad of social, familial, and environmental factors.
- Treatment strategies need to assess the psychobiological, social, spiritual, and pharmacological aspects of the patient's drug abuse.

What about Pharmacological Interventions?

- To date, there are NO FDA-approved pharmacological interventions for stimulant use disorders
- Several medications are currently being investigated for their safety and efficacy in treating cocaine and methamphetamine addiction.
- These medications will hopefully:
 - Block/reduce effects of the stimulant
 - Alleviate severe craving

Medications for Methamphetamine Use Disorder

Positive/Under Consideration

- bupropion (better in low severity users)
- mirtazapine
- naltrexone
- methylphenidate
 - d-amphetamine (craving/WD)
- topiramate*
(better if abstinent at treatment entry)

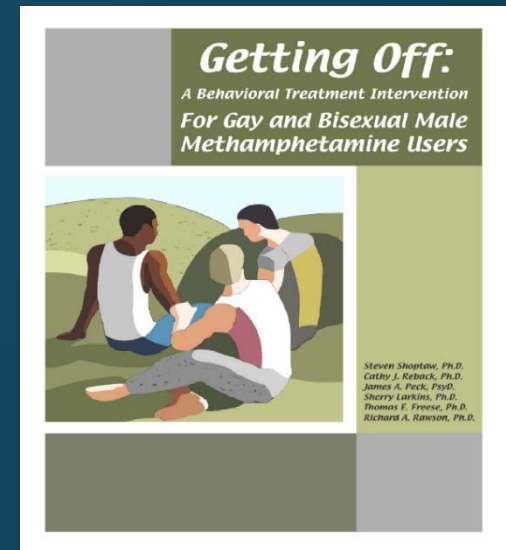
Clinical Challenges with Stimulant Dependent Individuals

- Limited understanding of stimulant addiction
- Ambivalence about need to stop use
- Cognitive impairment and poor memory
- Short attention span
- Anhedonia
- Powerful Pavlovian trigger-craving response
- Sleep disorders
- Poor retention in outpatient treatment
- Elevated rates of psychiatric co-morbidity

Behavioral Treatments

- Cognitive/Behavioral Therapy (CBT)
- Matrix Model of Outpatient Treatment
- Motivational Interviewing (MI)
- Contingency Management (CM)
- 12-Step Facilitation Therapy
- Community Reinforcement Approach (CRA)
- Red Road to Wellbriety
- Traditional Healing

Getting Off: A Behavioral Treatment Intervention for Gay and Bisexual Male Methamphetamine Users



Contingency
Management (CM):

Provide increasingly valuable
reinforcers for successive urine
samples documenting drug
abstinence

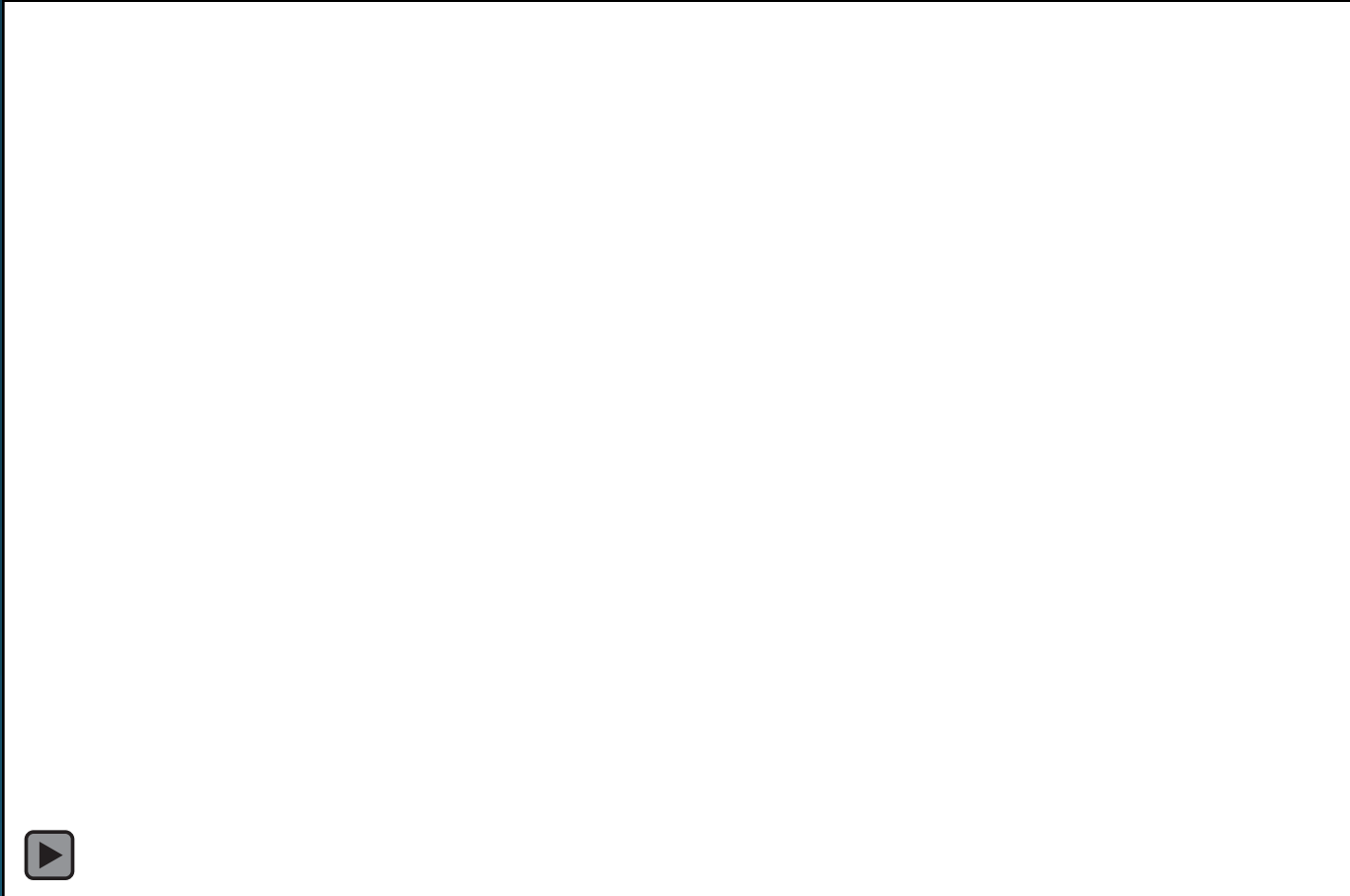
Gay-specific Cognitive
Behavioral Therapy
(GCBT):

Cognitive Behavioral strategies for
instilling abstinence and preventing
relapse in a gay-specific HIV risk
reduction intervention

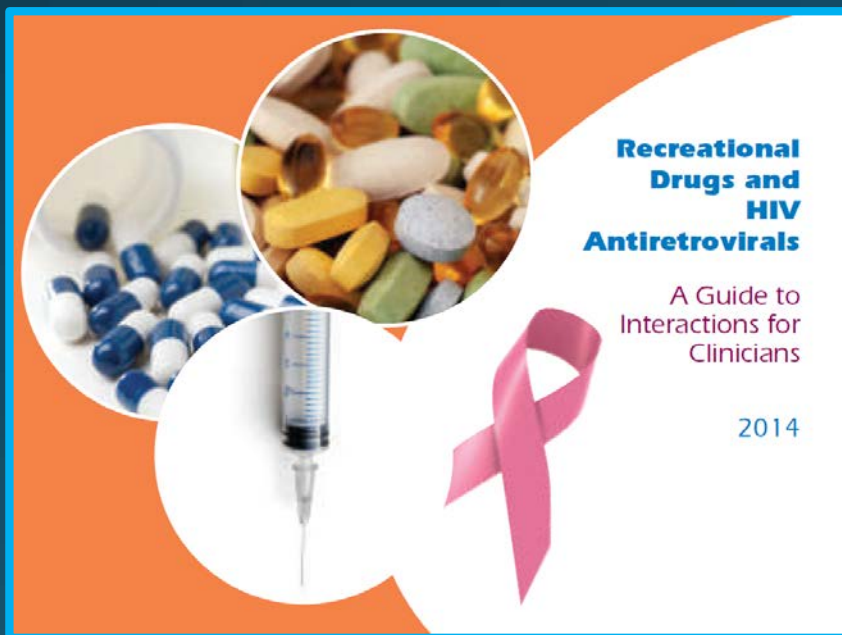
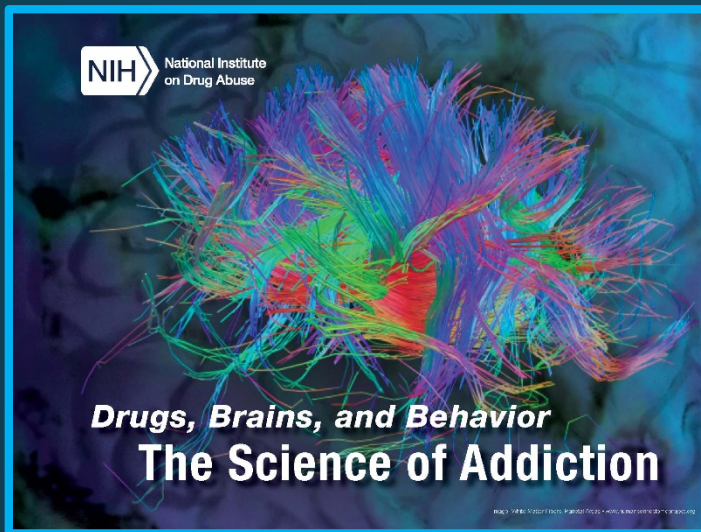
Exercise Study Results (Rawson et al., 2015)

- Lower severity methamphetamine users had significantly fewer positive urine results at the 3 follow-up points
- Exercise group participants had significantly lower scores on a measure of depression compared to the educ. group over the 8-week treatment period.
- Exercise group participants had significantly lower scores on a measure of anxiety compared to the educ. group over the 8-week treatment period.

Treatment Works, Long-Term Recovery is Possible



Key Resources



Thank you for your time!

For more information:

Beth Rutkowski: brutkowski@mednet.ucla.edu

Pacific Southwest ATTC: <http://www.psattc.org>